

and history, the evolution of the steam engine, anthropology, and the physical sciences. We are especially interested in the collections illustrating meteorology.

All the chief instruments employed in Government meteorological work have for some time past been installed and steadily recording atmospheric phenomena. These comprehend the following instruments: barographs, thermographs of two forms—Draper's and Richard's, solar radiation thermometers, psychrometers, wind electrical registration apparatus, the anemometer employed being the Robinson form, aneroid barometers, charts, maps, and rain measuring apparatus. There will also be installed electrical rain and snow recording apparatus, electrical sunshine recorder, and additional psychrometers. Samples of the instrumental charts are shown, as well as the complete series of publications which are based on these instruments. Since each instrument has a special explanatory label stating the kind of work which it is doing, the collection should be very useful to teachers and visiting classes.

In addition to these collections, courses of lectures are provided, and the second course in the series, which was inaugurated in April, embraced meteorology and was illustrated by practical illustrations with apparatus.

These lectures were entitled "A course of Instruction in Elementary Meteorology," and were delivered by Prof. Richard E. Call on eight successive Friday afternoons at 4 o'clock, beginning with April 20, and supplemented by two Saturday excursions, on which occasions the observing stations in the vicinity of New York City were inspected. The lectures were intended especially for teachers, but only forty could be admitted on account of the limited capacity of the room. The courses were free, but every one who registered must agree to attend the whole course. The titles of the lectures were as follows:

I. April 20. The Elementary Principles of Physics involved in Meteorology.

II. April 27. The Atmosphere and its Circulation.

III. May 4. Atmospheric Temperatures, their Measurement and Distribution.

IV. May 11. The Barometer; its Theory and its Use.

V. May 18. The Moisture of the Atmosphere.

VI. May 25. The Causes and Distribution of Rainfall.

VII. Weather and Climate.

VIII. June 8. Optical and Electrical Phenomena of the Atmosphere.

#### LECTURES ON METEOROLOGY.

Mr. Charles E. Linney, Section Director, Springfield, Ill., addressed the Kane County Farmers' Institute at Geneva on February 6, and also the Congregational Club at Springfield on February 13. He exhibited the thermometer, barometer, anemometer, rain gage, and also maps and charts. The lectures were followed by questions from the audience and replies by Mr. Linney, and in both cases were so well received that he has been requested to repeat them.

Mr. C. W. Ling, Observer, Havre, Mont. delivered an excellent lecture to the pupils of the grammar school at Havre, on January 17. This was in connection with the regular course on geography, and served to broaden the ideas of the pupils as to the comprehensiveness of that term. One can not study the divisions of the earth into land and water without asking how it all came about. We find that the atmosphere with its winds and rains has taken a most prominent part in the formation of the continents, with their mountains and valleys, so that not merely animal and vegetable life, but even the land itself and the ocean, depend upon

the atmosphere. Mr. Ling's lecture was largely occupied with a description of the daily map and the official work of the Bureau.

Mr. P. Connor, Local Forecast Official at Kansas City, Mo., writes as follows:

It may be a surprise for eastern schools and eastern readers to hear that one of the high schools of Kansas City, Mo., has adopted meteorology in its curriculum, as one of the elective studies of the school, to be pursued systematically the same as botany or geology, German or Latin.

It is with pardonable pride that I allude to this, for I have been here so long that I am identified with the city's interests. I may also add that it is proof that meteorology has not been a dead issue in this community. I think that the Weather Bureau should feel a genuine interest in having the stamp of popularity thus placed upon this branch of science.

Mr. Porter Graves has the chair of meteorology, and he is entitled to much credit for having advocated its adoption. He started with a class of twenty-five last winter, but expects a much larger class, if not two classes, next year. Observations are taken at noon, daily, of barometer, dry and wet thermometers, clouds, etc. Six weather maps have been furnished daily for study. The class has visited this office to learn the practical working of all the instruments, and in many other ways we have cooperated with Mr. Graves to make his work a success.

On March 16 the Editor had the privilege of an hour's talk with the teachers of Baltimore, Md., on popular methods of presenting meteorology to the lower grades in the public schools. He dwelt on the simplicity of children's thoughts, the honesty and directness of their questions. Every question that a child asks is legitimate and demands an honest, satisfactory, and truthful reply. The study of nature is instinctively the child's daily work; he needs no stimulus, but neither should he be repressed. The teacher should encourage him to collect leaves, stones, shells, bugs, it matters not what; teach him to observe most carefully by seeing, feeling, and listening. The child observes and thinks: the teacher is to supply him with the appropriate words from that encyclopedia of all knowledge, the English dictionary. The teacher should also help him to reason correctly, for that, strange to say, is an art that does not come by intuition, but only by experience guided by observation and experiment. Agassiz educated naturalists by giving them a mass of material and asking them to tell him what they saw and what conclusions they could draw. It is not our business to fill the mind with other people's ideas but to make the child's mind develop such ideas as the better judgment of the teacher recognizes as appropriate and true. Meteorology is first to be studied by observation and record; we begin by recording general impressions but gradually develop greater exactness by the help of instruments. A class of children may keep a regular record in common, as a class, or still better, individually, as persons, showing the wind, temperature, cloudiness, weather, and other details at 8 a. m. every morning. In reasoning upon these items the child begins to think of temperature, moisture, and pressure as the ultimate causes, and may then begin to observe and understand the thermometer, barometer and hygrometer. There is nothing scientific that man has learned from nature but what may be made comprehensible to the child. No matter how great the difficulties experienced by the scientist in getting at the facts and laws of nature, yet, when once attained, they seem to be so elegant and natural that the child can easily learn them. It is unnecessary and wrong to answer a child's inquisitiveness by saying that so-and-so is too difficult. It may be difficult for the teacher to explain it, but it is not too difficult to comprehend when once it is properly explained. It is much more proper for the teacher to say I do not know or I can not explain, than to say the thing is too difficult for you. All the scientific

knowledge of the present day must be put into simple form for the use of the children of the next generation, in order that they may have time to acquire the higher or advanced knowledge that will have to be taught fifty years hence; just as we now teach in the high school that which was appropriate for the university in the days of Galileo and Newton.

#### METEOROLOGY IN THE UNIVERSITIES.

For many years Prof. William H. Brewer, of Yale College, has delivered courses of lectures on meteorology in the Sheffield Scientific School. The third edition of the syllabus of lectures was published in December, 1896; a fourth edition dated September, 1899, has lately been received. In this edition 13 lectures are enumerated, covering 190 topics, whereas in the third edition, 15 lectures and 206 topics were given. Some of these topics are merely referred to in the lectures, but are introduced in logical order as suggestions to those students who wish to pursue the subject farther. The titles of the 13 lectures are as follows:

- I. Introduction.
- II. The Atmosphere.
- III. Temperature.
- IV. Pressure.
- V. Winds and Circulation.
- VI. Atmospheric Moisture.
- VII. Condensation of Atmospheric Moisture.
- VIII. Cyclones and Anticyclones.
- IX. Other Storms and Winds.
- X. Rainfall and its Distribution.
- XI. Public Weather Service.
- XII. Atmospheric Electricity.
- XIII. Optical Meteorology.

Since the establishment of the school of forestry at Yale College, Professor Brewer's lectures to the students of forestry have included, not merely the above course in meteorology, but also additional lectures on the relations of forestry and meteorology, including the following special subjects:

General conditions necessary to forests; elementary meteorology; forests as related to temperature and its range; to rainfall and its range; to excesses of weather and climate; to the mechanical and chemical nature of soil and groundwater; to the geological character of the surface; to the relief forms of the land; to other geographical features; the geographical distribution of forests; the aspects of forests as related to climate and topography; and the geological history of forests.

#### THE WEATHER BUREAU AND THE UNIVERSITIES.

It is difficult to fully record or realize the activity of the Weather Bureau officials in the matter of lectures on meteorology and cognate subjects. We are especially interested in lectures of a highly instructive character delivered to the students in colleges and universities and if the Editor sometimes fails to mention these in the MONTHLY WEATHER REVIEW, he hopes that the respective lecturers will promptly send him a memorandum for publication.

Several lectures have been delivered from time to time by Mr. Charles Stewart of Spokane, Wash.; the last in his series was that delivered on February 24 for the faculty and students at Gonzaga College. The address was illustrated by means of four large charts prepared by Mr. Stewart, who spoke upon the utility of scientific weather observations. Before concluding, Mr Stewart gave replies to questions put by his hearers, whose appreciation was evinced by hearty applause.

A course of five lectures on advanced meteorology was de-

livered before the students in mathematical physics, at the Johns Hopkins University, May 7-11, 1900, by Prof. F. H. Bigelow of the United States Weather Bureau, on the following topics:

1. A new method of deducing the general equations of motion on the rotating earth.
2. The treatment of the aqueous vapor in barometric and thermodynamic problems.
3. Application of this discussion to the theory of the formation of clouds.
4. The Ferrel and the German types of circulation in the general and the local cyclones.
5. The results of the international cloud observations in the United States, and their indications regarding the circulation of the atmosphere.

The series of lectures on meteorology delivered by Dr. O. L. Fassig, at the Johns Hopkins University, by permission of the Chief of the Weather Bureau, came to a close on March 17, and we make the following extracts from his report on the subject:

The character of the series was somewhat changed this year. In place of the regular University lectures to a small number of students, the series was placed in the public educational course inaugurated by the University last year. This made it necessary to put the lectures into more popular form; at the same time the size of the class was greatly increased. Last year the class consisted of 7 or 8 University students; this year it comprised about 80 public school teachers and principals and 5 University students. The regular course consisted of 15 class lectures, covering the general subject of meteorology and climatology and the work of the United States Weather Bureau. A supplementary course of 6 lectures was added; in this course I had the generous cooperation of Professor Abbe and of Mr. Walz of the Weather Bureau and of Mr. Page of the United States Hydrographic Office.

The period covered by the courses was from January 6 to March 17, 1900, 2 lectures being given each week. Attendance was free to University students and to members of the local office of the Weather Bureau. From others of the class a subscription of \$3 was required for the course. An additional fee of \$2 was required of those receiving a certificate at the close of a successful written examination.<sup>1</sup>

The scope of topics treated may be seen from an inspection of the lecture outlines and illustrative diagrams submitted herewith. A detailed outline of each lecture was printed and given to members of the class. In addition to the printed outlines the chalk plate process was freely used in preparing diagrams to illustrate principles and conditions. The diagrams have given much satisfaction to members of the class, and have added greatly to a better understanding of the subjects treated. Judging from comments made by President Gilman, Dr. Clark, and members of the class, I infer that the course of lectures has given satisfaction.

The members of the class have shown much interest in the subject of meteorology and in the work of the Weather Bureau; it was a source of much encouragement to me to find this interest maintained to the end of the course.

I have from time to time received requests from other members of the Bureau for copies of my lecture notes. Having spent much time and labor in the preparation of my outlines and diagrams, in addition to my notes, and thinking that they may be of some value to my colleagues, I have collected together a few sets like the pamphlet submitted herewith, and have sent them to those Weather Bureau officials who are engaged in similar work at other universities.

#### THE CLIMATOLOGY OF CALIFORNIA.

The reports of the California section are rich in valuable climatological data, thus: The number for April contains an article on the climate of Salinas, presumably by Mr. McAdie. The March number contains the summary, by Dr. A. K. Johnson, voluntary observer at that place, on the climatology of San Bernardino. The February number contains one on the climatology of Fresno by Mr. J. P. Bolton, observer, Weather Bureau, at that place. The January number has an article on the climate of Los Angeles by Mr. G. E. Franklin, local forecast official. Doubtless this excellent series will be con-

<sup>1</sup> These fees belong to the University.—C. A.